



FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

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November 27, 2017 (revised February 5, 2018)

North Carolina Department of Transportation
Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, North Carolina 27610

Attn.: Mr. Gordon Box, L.G.
GeoEnvironmental Project Manager

Re: State Project: R-2530B
WBS Element: 34446.1.6
NC 24-27 from Bird Road in Albemarle to West of the Pee Dee River

Subject: Preliminary Site Assessment
Parcel #142 – Kenneth Helderma (Vacant Garage)
48198 NC 24-27
Albemarle, North Carolina
F&R Project #66V-0092


Dear Mr. Box:

Froehling and Robertson, Inc. (F&R) has completed the authorized Preliminary Site Assessment at the Kenneth Helderma property located in Albemarle, North Carolina. The work was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017). Notice to Proceed was issued to F&R on July 6, 2017. This report documents our field activities, presents the results of laboratory analysis and provides estimated quantities of petroleum impacted soils.


Please do not hesitate to contact us if you should have any questions regarding this report.

Sincerely,

FROEHLING & ROBERTSON, INC.

DocuSigned by:

4DB7F275EBFD410...

Clint E. Sorrell
Environmental Scientist

DocuSigned by:

E425D6E8C235496...



Benjamin A. Whitley, P.E.
GeoEnvironmental Services Manager



PRELIMINARY SITE ASSESSMENT

Kenneth Helderan (Parcel #142)

Vacant Garage

48198 Hwy 24-27

Albemarle, North Carolina

State Project: R-2530B

WBS Element: 34446.1.6

F&R Project #66V-0092

November 27, 2017 (revised February 5, 2018)

Prepared for:

North Carolina Department of Transportation

Geotechnical Engineering Unit

1020 Birch Ridge Drive

Raleigh, NC 27610



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**Preliminary Site Assessment Report
Kenneth Helderma Property (Parcel #142)
Albemarle, Stanly County, North Carolina
F&R Project No. 66V-0092**

1.0 Introduction

Froehling and Robertson, Inc. (F&R) has prepared this Preliminary Site Assessment (PSA) Report to document soil assessment activities performed at the Kenneth Helderma Property addressed as 48198 NC 24-27, in Albemarle, Stanly County, North Carolina. The site is located on the southwest quadrant of the NC 24-27 and Indian Mound Road intersection as shown in Appendix I, Figures 1 and 2. As indicated in the Request for Technical and Cost Proposal (RFTCP) and property tax cards, the site operates as an existing private service garage. According to the NCDEQ UST Section Registry no Facility ID has been assigned for the site. However, the site was reported to have operated as a gas station by a local historian.

According to the NCDOT within their RFTCP, acquisition of right-of-way is necessary for the proposed NC 24-27 design. As such, the NCDOT requested a PSA be performed to assess the possibility of encountering petroleum impacted soil from known or unknown USTs, and to locate USTs which may exist within proposed easements and right-of-way at the project site.

The PSA was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017) with Notice to Proceed issued to F&R by the NCDOT on July 6, 2017. The purpose of this report is to document field activities, present the results of laboratory analysis, and provide estimated quantities of petroleum impacted soils.

The existing on-site structure is one-story in height and is constructed of brick and wood siding with steel framing. The remainder of the site consists of cleared and wooded land. The site is bordered to the north by NC 24-27; to the south by scattered residences and a trucking facility; to the east by Indian Mound Road; and to the west by Indian Mound Road Extension. Access to the site is gained from NC 24-27 to the north and Indian Mound Road to the east.

2.0 Geophysical Survey

Prior to F&R's soil assessment activities, Pyramid Environmental & Engineering, P.C. (Pyramid) conducted a geophysical survey to locate suspect metal underground storage tanks (USTs). The geophysical work was conducted on July 21, 2017, and was performed within proposed easements and right-of-way of NC 24-27.



The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61 instrument. The EM61 data was collected along parallel survey lines spaced approximately 5 feet apart. No Ground-penetrating radar (GPR) investigations were performed. The data was reviewed in the field to evaluate the possible presence of USTs and later transferred to a desktop computer for further review. Isolated EM anomalies were identified on the site, including metal gates, a metal fence, signs, and reinforced pipe.

Based on the EM data collected at the site, Pyramid did not observe anomalies that were interpreted to be the results of metallic USTs within about 8 feet of the ground surface. The complete geophysical report is attached as Appendix II.

3.0 Site Assessment Activities

F&R visited the site on August 30, 2017 to perform the Preliminary Site Assessment. The assessment consisted of advancing 9 borings into the soils at the project site using direct-push technology (GeoProbe). The boring locations were determined by F&R staff based on the results of the geophysical survey, site features and proposed construction activities. Five of the borings (B-1 through B-5) were advanced on the northern portion of the site adjacent to NC 24-27. Borings B-6 through B-9 were advanced on the eastern portion of the site adjacent to Indian Mound Road. F&R attempted to advance the borings to the proposed depth of 10 feet below ground surface (bgs). However, Borings B-1, B-2, and B-4 through B-9 were terminated at depths ranging from 4 to 9 feet bgs, where GeoProbe refusal was encountered. Photos detailing existing site features are attached as Appendix III and boring locations are depicted in Figure 3 of this report.

Soil sample cores from the borings were collected in disposable, 4-foot long acetate sleeves. The soil samples were visually/manually classified and screened in the field using a calibrated photo-ionization detector (PID) for evidence of petroleum hydrocarbons. Evaluation of VOC concentrations were performed using a calibrated MiniRae 3000 PID which produces results in parts per million (ppm). A representative soil sample was collected from two foot sections of each sleeve and placed in a re-sealable plastic bag. The vapors were then allowed to equilibrate in the headspace of the bag for approximately ten minutes prior to measurement with the PID. The measurements were collected by placing the probe tip into the headspace of the bag. PID measurements can be found in the GeoProbe Logs in Appendix IV, as well as in Table 1 in Section 5.0 below.



Generally, the soil sample in each boring which exhibited the highest PID concentration was submitted for laboratory analysis for diesel range organics (DRO), gasoline range organics (GRO), Total BTEX (benzene, toluene, ethylbenzene and xylenes), 16 PAHs (polycyclic aromatic hydrocarbons) and BaP (Benzo(a)pyrene) by Ultraviolet Fluorescence (UVF) technology (RedLab QED Hydrocarbon Analyzer).

The samples were collected in laboratory-supplied sample containers, placed in a cooler with ice, and shipped via UPS to RedLab in Wilmington, North Carolina following standard chain-of custody procedures.

4.0 Subsurface Conditions

As indicated in the attached GeoProbe Logs (Appendix IV), subsurface conditions from existing ground surface to boring termination primarily included various layers of dry-moist-wet, red-orange-brown-gray-tan silty sandy clay; and dry-moist, tan-brown-gray, silty fine to medium sand with stone and gravel. F&R attempted to advance the borings to the proposed depth of 10 feet bgs. However, Borings B-1, B-2, and B-4 through B-9 were terminated at depths ranging from 4 to 9 feet bgs, where GeoProbe refusal was encountered in interbedded layers of dense silty sandy with stone and gravel. PID readings generally ranged from 3.2 to 9.8 ppm. However, elevated VOC levels (27.8 to 30.8 ppm) were encountered in Boring B-1 from 2 to 4 feet bgs. Petroleum odors and/or groundwater were not observed during field screening or sample collection activities.

5.0 Analytical Results

As shown in the following table, petroleum hydrocarbons identified as GRO were detected in the soil sample at boring location B-7, at a depth from 2 to 4 feet bgs. The laboratory results indicate that the GRO concentration at B-7 was 1.4 mg/kg, which is below the NCDEQ UST Section GRO Action Level of 50 mg/kg.

Petroleum hydrocarbons identified as DRO were detected in the soil samples at seven boring locations advanced at the site (B-1 through B-4 and B-7 through B-9), at depths from 0 to 2 feet bgs (B-9) to 6 to 8 feet bgs (B-6). The laboratory results indicate that the DRO concentrations ranged from 0.2 mg/kg (B-2) to 28 mg/kg (B-3), which are below the NCDEQ UST Section DRO Action Level of 100 mg/kg.



The laboratory analytical results indicate concentrations of the sum of 16 EPA PAHs above the method detection limit, but below the total NCDEQ Action Level of 9,068.816 mg/kg at Boring B-3. The soil analytical results are summarized in Table 1 below. The laboratory analytical results can also be found in the attached Appendix V of this report.

Table 1
Soil Sampling Analytical Results

Sample ID	Sample Date	Sample Depth (ft bgs)	PID Reading (ppm)	GRO (mg/kg)	DRO (mg/kg)	TPH (mg/kg)	Total BTEX (mg/kg)	Total Aromatics (mg/kg)	16 EPA PAHs (mg/kg)	BaP (mg/kg)
B-1	8/30/17	2-4	30.8	<0.64	2	2	<0.64	1.1	<0.21	<0.026
B-2		2-4	5.8	<0.2	0.2	0.2	<0.2	0.12	<0.06	<0.008
B-3		2-4	8.5	<0.54	28	28	<0.54	15.6	0.87	0.053
B-4		4-6	7.0	<0.49	0.49	0.49	<0.49	0.3	<0.16	<0.019
B-5		2-4	6.0	<0.6	<0.6	<0.6	<0.6	<0.12	<0.19	<0.024
B-6		6-8	5.8	<0.55	<0.55	<0.55	<0.55	<0.11	<0.17	<0.022
B-7		2-4	7.0	1.4	0.57	1.97	<0.57	0.28	<0.18	<0.023
B-8		2-4	5.8	<0.52	5.4	5.4	<0.52	2.4	<0.17	<0.021
B-9		0-2	4.3	<0.25	0.25	0.25	<0.25	0.13	<0.08	<0.01
NCDEQ Action Level				50	100	NSE	13.8056	NSE	9,068.816	0.088

Samples shown in bold exceed the NCDEQ Action Level as outlined in the NCDEQ, DWM, UST Section Guidelines
ppm = parts per million

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

TPH = Total Petroleum Hydrocarbons

BTEX = Benzene, Toluene, Ethylbenzene and Xylenes

NSE = No Standard Exists

6.0 Conclusions and Recommendations

F&R conducted a PSA at the Kenneth Helderan Property addressed as 48198 NC 24-27, in Albemarle, Stanly County, North Carolina. A geophysical investigation was performed by Pyramid Environmental & Engineering to investigate the presence and location of USTs within proposed easements and right-of-way at the project site. Based on the results of the geophysical survey, it was determined that USTs were not present within the surveyed area.

Nine GeoProbe borings were advanced during the assessment within proposed easements and right-of-way, where grading activities are proposed in association with the NC 24-27 improvements. Based on the results of laboratory testing and observed PID readings, petroleum impacted soils were found in the vicinity of boring locations B-1 through B-4 and B-7 through B-9. Laboratory analysis detected concentrations of DRO at these locations, and GRO at boring



location B-7; however, the concentrations of these compounds were below the NCDEQ Action Level of 100 mg/kg DRO and 50 mg/kg GRO.

It should be noted that a delineation of the soil contamination was not performed, as this was not included in the proposed scope of work. The above conclusions are based on interpretations of soil analytical results, PID readings and our experience with petroleum UST releases.

7.0 Limitations

These services have been performed, under authorization of the North Carolina Department of Transportation for specific application on this project. These services have been performed in accordance with generally accepted environmental and hydrogeological practices. No other warranty, expressed or implied is made. As with any subsurface investigation, actual conditions exist only at the precise locations from which samples were taken. Certain inferences are based on the results of sampling and related testing to form a professional opinion of conditions in areas beyond those from which samples were taken. Our conclusions and recommendations are based upon information provided to us by others, our sampling and testing results and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations are based upon conditions readily visible at the site at the time of our site visits.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state or federal public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. In areas that require notification of local, state, or federal public agencies as required by law, it is the Client's responsibility to so notify.

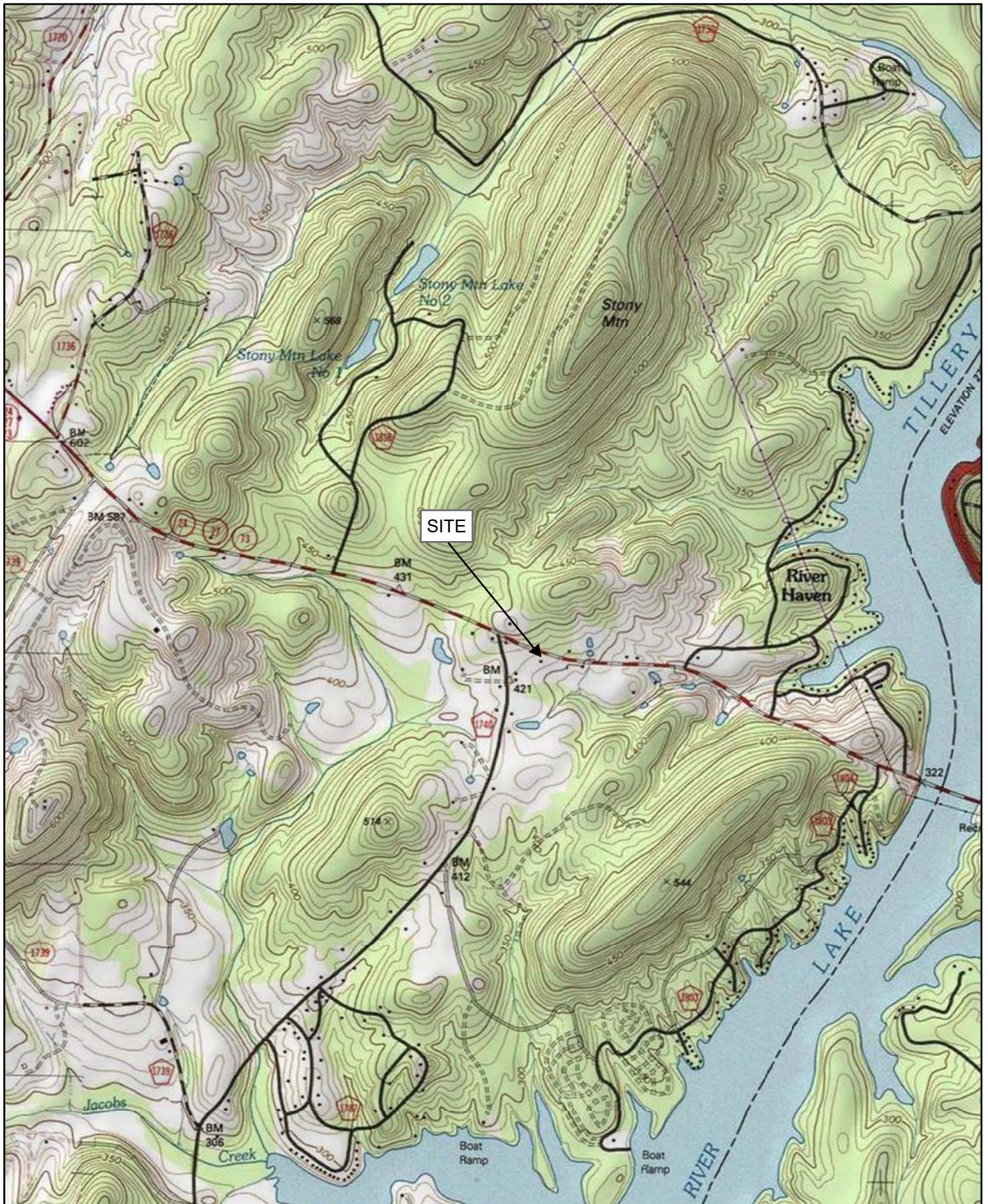


APPENDIX I

Figure No. 1 – TOPOGRAPHIC MAP

Figure No. 2 – SITE VICINITY MAP

Figure No. 3 – LABORATORY RESULTS & BORING LOCATION PLAN



SITE TOPOGRAPHIC MAP

0 1,000 2,000 4,000 6,000 Feet



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Client: NCDOT

Project: R-2530B PSAs

Location: Parcel #142, Albemarle

F&R Project No.: 66V-0092

48198 Highway 24-27 East - Albemarle, North Carolina

Date: USGS 2013

Date: November 2017 (Revised Feb. 5, 2018)

Scale: 1:24,000 1 inch = 2,000 feet

Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.

FIGURE
No.: 1



SITE VICINITY MAP

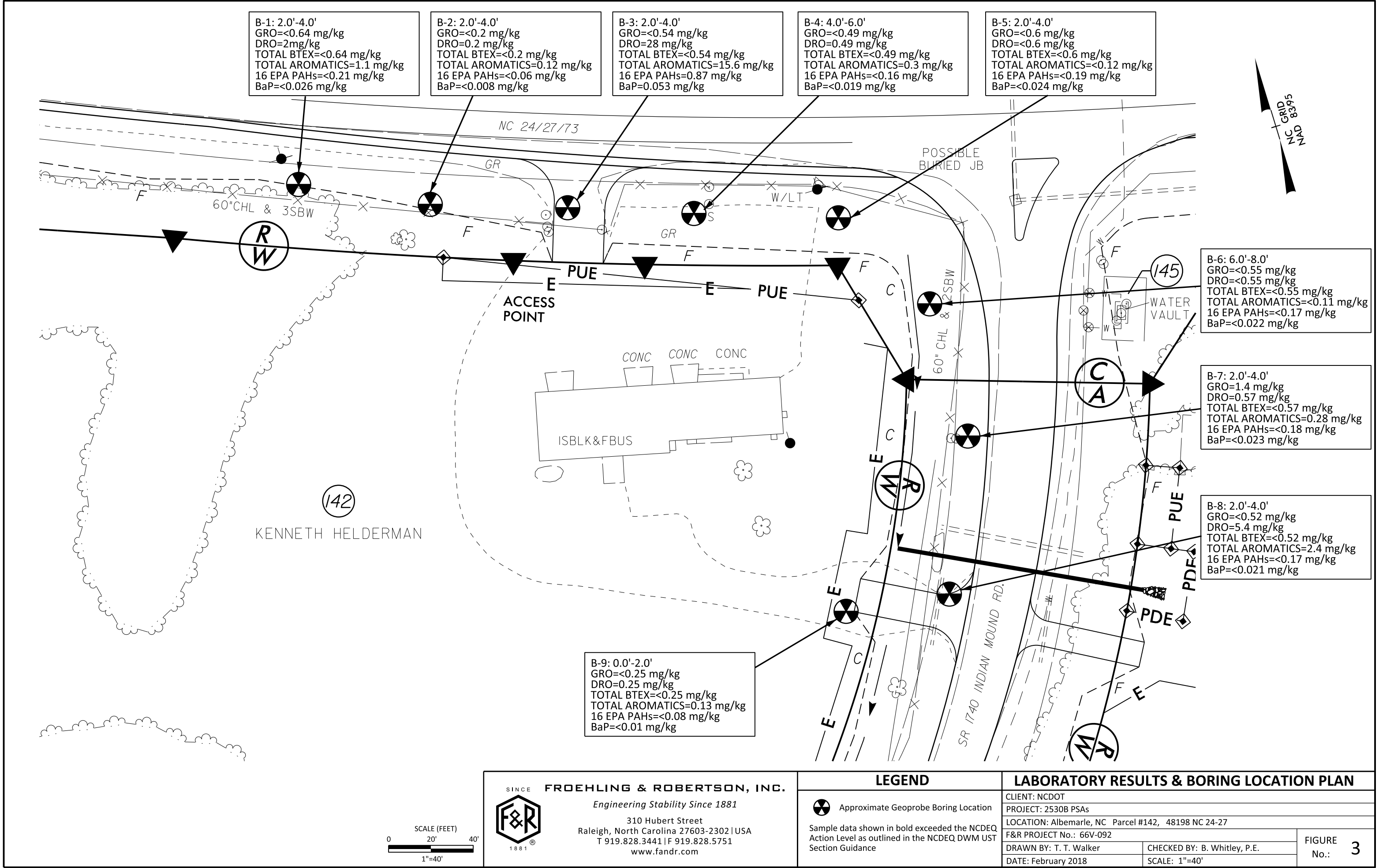
0 100 200 400 600 Feet



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Client:	NCDOT	Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.
Project:	R-2530B PSAs	
Location:	Parcel #142, Albemarle	
F&R Project No.:	66V-0092 48198 Highway 24-27 East - Albemarle, North Carolina	
Data:	ArcMap Imagery	
Date:	November 2017 (Revised Feb. 5, 2018)	Scale: 1:2,400 1 inch = 200 feet

FIGURE
No.: 2





APPENDIX II

GEOPHYSICAL REPORT PREPARED BY PYRAMID



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2017-203)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION: PARCEL 142 NCDOT PROJECT R-2530B

48198 HWY. 24/27, ALBEMARLE, NC

AUGUST 31, 2017

Report prepared for:

Benjamin Whitley, P.E.
Froehling and Robertson
310 Hubert Street
Raleigh, North Carolina 27603

Prepared by: _____

A handwritten signature in black ink, appearing to read "E. Cross".

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

A handwritten signature in black ink, appearing to read "Doug Canavello".

Douglas A. Canavello, P.G.
NC License #1066

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C257: GEOLOGY

C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 142 – 48198 HWY. 24/27
Albemarle, Stanly County, North Carolina

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- Figure 1 – Parcel 142 Geophysical Survey Boundaries and Site Photographs
Figure 2 – Parcel 142 EM61 Results Contour Map
Figure 3 – Overlay of Geophysical Survey Boundaries on NCDOT Engineering Plans

LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Froehling & Robertson, Inc. (F&R) at Parcel 142, located at 48198 HWY. 24/27, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted on July 21, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of an electromagnetic (EM) induction-metal detection survey. A total of five EM anomalies were identified. All of the EM anomalies were directly attributed to visible cultural features at the ground surface. For this reason, a GPR survey was not required. Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 142.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Froehling and Robertson, Inc. (F&R) at Parcel 142, located at 48198 HWY. 24/27, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted on July 21, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a commercial building surrounded by an asphalt parking area and grass medians. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of an electromagnetic (EM) induction-metal detection survey. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at approximately 0.8-foot intervals along north-south trending or east-west trending,

generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 14.0 software programs.

GPR data were not collected due to all EM anomalies being directly attributed to visible cultural features at the ground surface (see *Discussion of Results* section below).

Pyramid’s classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist’s discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Metal gate	
2	Metal fence	
3	Sign	
4	Reinforced pipe	
5	Metal gate	

All of the EM anomalies were directly attributed to visible cultural features including a metal fence and gates, a sign, and a reinforced concrete pipe. For this reason, a GPR survey was not required.

Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 142.

Figure 3 provides an overlay of the geophysical survey area onto the NCDOT MicroStation engineering plans (proposed ROW and easements) for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 data collected at Parcel 142 in Albemarle, North Carolina, provides the following summary and conclusions:

- The EM61 survey provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- All of the EM anomalies were directly attributed to visible cultural features at the ground surface. For this reason, a GPR survey was not required
- Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 142.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for F&R in accordance with generally accepted guidelines for EM61 surveys. It is generally recognized that the results of the EM61 surveys are non-unique and may not represent actual subsurface conditions. The EM61 results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.




APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area
(Facing Approximately Northwest)

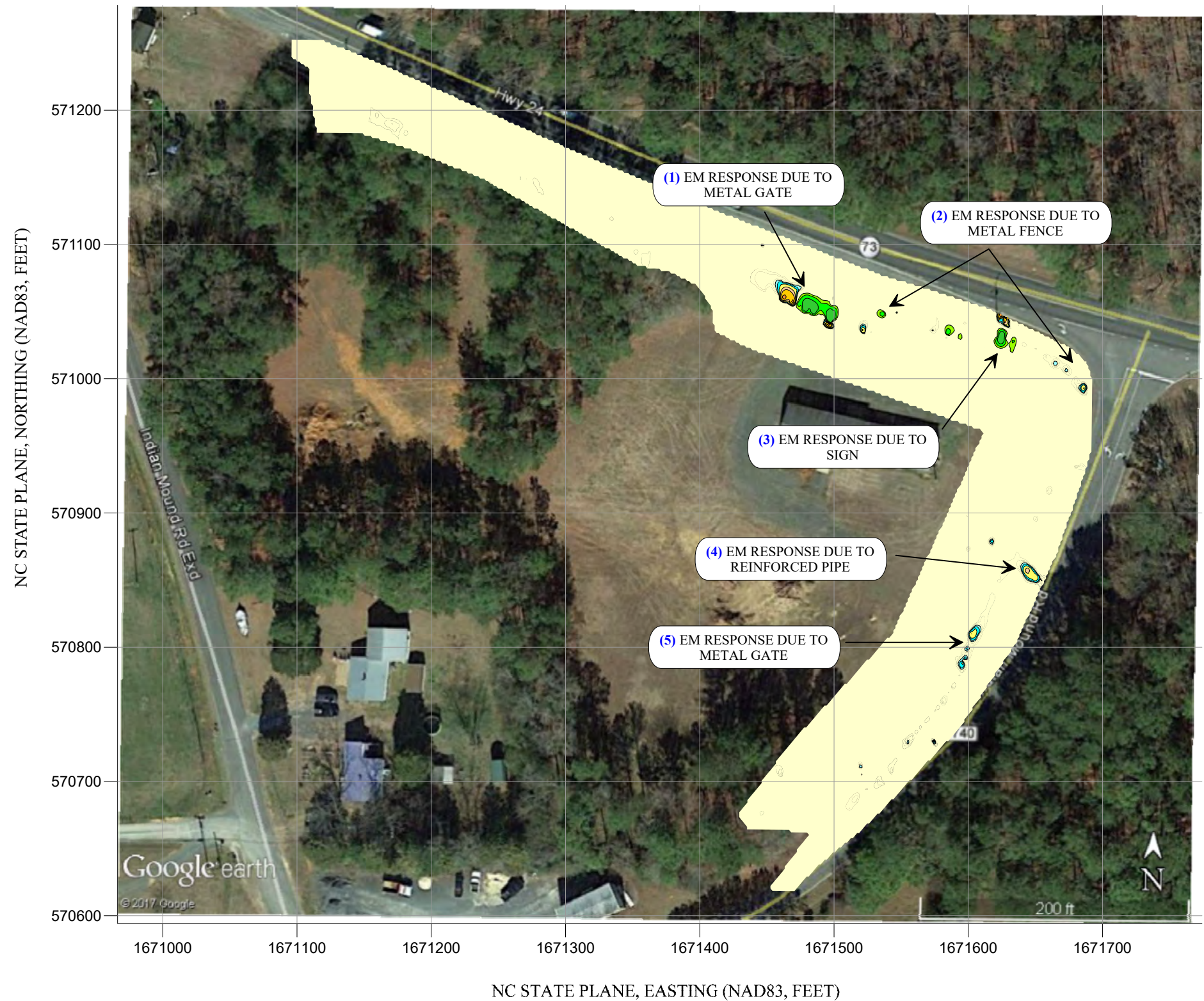


View of Survey Area
(Facing Approximately South)

TITLE PARCEL 142 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS		
PROJECT PARCEL 142 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B		
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2017-203	FIGURE 1



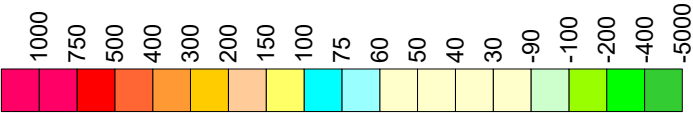
EM61 METAL DETECTION RESULTS




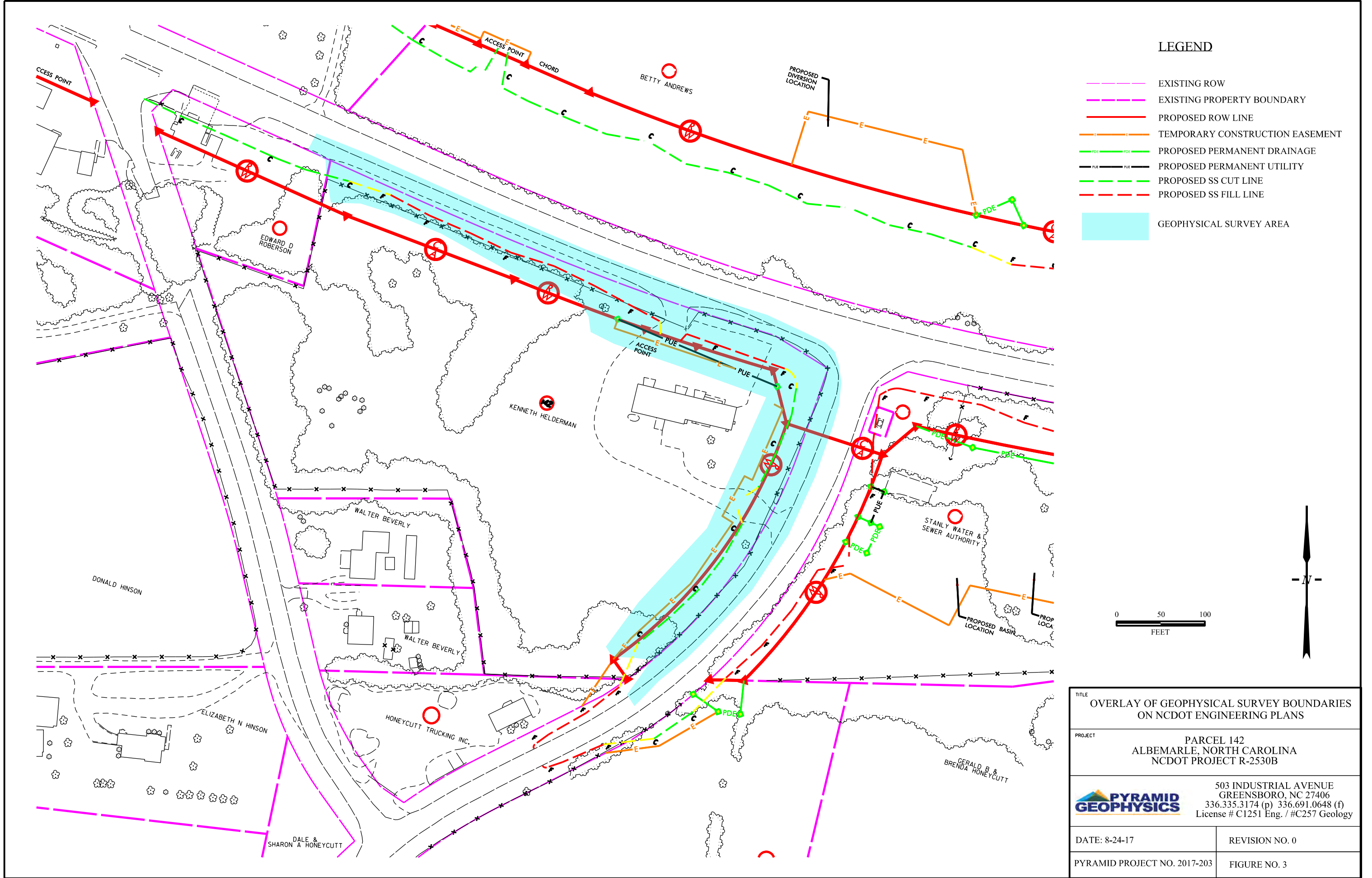
NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on July 21, 2017, using a Geonics EM61 instrument. Verification GPR data were not required due to all EM anomalies being directly attributed to cultural features.

EM61 Metal Detection Response (millivolts)




TITLE		PARCEL 142 - EM61 RESULTS CONTOUR MAP	
PROJECT		PARCEL 142 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON	
PYRAMID PROJECT #:	2017-203	FIGURE 2	



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- TEMPORARY CONSTRUCTION EASEMENT
- PROPOSED PERMANENT DRAINAGE
- PROPOSED PERMANENT UTILITY
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE
- GEOPHYSICAL SURVEY AREA

TITLE OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES ON NCDOT ENGINEERING PLANS	
PROJECT PARCEL 142 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
<div> 503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology</div>	
DATE: 8-24-17	REVISION NO. 0
PYRAMID PROJECT NO. 2017-203	FIGURE NO. 3



APPENDIX III

SITE PHOTOS



Photo #1: Boring locations B-1 and B-2, facing northwest.



Photo #2: Boring location B-3, facing south.



Photo #3: Boring locations B-4 and B-5, facing east.



Photo #4: Boring location B-6 and B-7, facing north.



B-8

Photo #5: Boring location B-8, facing north.



B-9

Photo #6: Boring location B-9, facing northeast.



APPENDIX IV

GEOPROBE LOGS



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-1 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 7.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Dry, Brown, Silty Sandy Clay			One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	2.0	Dry, Tan Brown, Silty Fine to Medium Sand with Stone	2.0	27.8	
	4.0		4.0	30.8	
	6.0		6.0	9.8	
	7.0	Geoprobe Boring Terminated by Direct Push Refusal at 7 feet.	7.0	4.8	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-2 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 9.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Dry, Brown, Silt with Stone			One sample collected for laboratory analysis (2.0-4.0)
	2.0	Moist, Red Brown, Silty Sandy Clay	2.0	5.4	No petroleum odors observed.
	4.0		4.0	5.8	
	6.0	Dry, Tan, Silty Fine to Medium Sand with Stone	6.0	5.1	
	8.0		8.0	5.4	
	9.0	Geoprobe Boring Terminated by Direct Push Refusal at 9 feet.	9.0	4.7	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-3 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 10.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Dry, Brown, Silty Fine to Medium Sand with Gravel			One sample collected for laboratory analysis (2.0-4.0)
	2.0	Moist, Red Brown, Silty Sandy Clay with Gravel	2.0	7.2	No petroleum odors observed.
	4.0		4.0	8.5	
	6.0	Moist, Gray, Silty Sandy Clay	6.0	7.7	
	8.0	Moist to Wet, Gray, Silty Sandy Clay	8.0	7.5	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0	6.0	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-4 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 9.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist, Brown, Silty Fine to Medium Sand with Gravel			One sample collected for laboratory analysis (4.0-6.0)
	2.0	Dry, Brown, Silty Sandy Clay	2.0	3.2	No petroleum odors observed.
	4.0	Moist, Red Brown, Silty Sandy Clay	4.0	7.0	
	6.0		6.0	7.0	
	8.0	Moist, Brown Gray, Silty Sandy Clay	8.0	6.2	
	9.0	Geoprobe Boring Terminated by Direct Push Refusal at 9 feet.	9.0	5.3	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-5 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 4.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Dry, Brown, Silty Fine to Medium Sand			One sample collected for laboratory analysis (2.0-4.0)
					No petroleum odors observed.
	2.0		2.0	5.5	
	4.0	Geoprobe Boring Terminated by Direct Push Refusal at 4 feet.	4.0	6.0	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-6 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 8.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Dry, Orange Brown, Silty Sandy Clay	2.0	5.0	One sample collected for laboratory analysis (6.0-8.0) No petroleum odors observed.
	4.0	Moist, Tan Brown, Silty Sandy Clay	4.0	5.8	
	6.0	Dry, Tan, Silty Fine to Medium Sand with Gravel	6.0	5.3	
	8.0	Geoprobe Boring Terminated by Direct Push Refusal at 8 feet.	8.0	5.8	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-7 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 9.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Dry, Brown, Silty Sandy Clay	2.0	5.9	One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	4.0	Dry, Red Brown, Silty Sandy Clay	4.0	7.0	
	6.0	Wet, Gray Brown, Silty Sandy Clay	6.0	4.2	
	8.0	Wet, Gray, Silty Sandy Clay	8.0	5.1	
	9.0	Geoprobe Boring Terminated by Direct Push Refusal at 9 feet.	9.0	4.4	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-8 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 9.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist, Orange Brown, Silty Sandy Clay			One sample collected for laboratory analysis (2.0-4.0)
	2.0		2.0	5.4	No petroleum odors observed.
	4.0		4.0	5.8	
	6.0	Wet, Orange Brown, Silty Sandy Clay	6.0	5.1	
	8.0	Dry, Gray, Silty Fine to Medium Sand with Stone	8.0	4.8	
	9.0	Geoprobe Boring Terminated by Direct Push Refusal at 9 feet.	9.0	5.2	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P142 B-9 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 4.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/30/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Dry, Tan Brown, Silty Fine to Medium Sand with Stone			One sample collected for laboratory analysis (0.0-2.0)
	2.0	Dry, Gray Tan, Silty Fine to Medium Sand with Stone	2.0	4.3	No petroleum odors observed.
	4.0	Geoprobe Boring Terminated by Direct Push Refusal at 4 feet.	4.0	4.0	



APPENDIX V

LABORATORY ANALYTICAL RESULTS



Hydrocarbon Analysis Results

Client: F&R
Address: 310 HUBERT ST.
RALEIGH, NC

Samples taken
Samples extracted
Samples analysed

Wednesday, August 30, 2017
Wednesday, August 30, 2017
Friday, September 1, 2017

Contact: BEN WHITLEY

Operator

PANTESCO

Project: NCDOT-R2530B-P142

U04049

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	P142-B1 (2-4)	25.7	<0.64	<0.64	2	2	1.1	<0.21	<0.026	0	75.4	24.6	Deg.PHC 82%,(FCM),(BO)
s	P142-B2 (2-4)	8.0	<0.2	<0.2	0.2	0.2	0.12	<0.06	<0.008	0	68.7	31.3	V.Deg.PHC 63.2%,(FCM),(BO),(P)
s	P142-B3 (2-4)	21.7	<0.54	<0.54	28	28	15.6	0.87	0.053	0	46.6	53.4	Deg.PHC 48.1%,(FCM),(BO)
s	P142-B4 (4-0)	19.4	<0.49	<0.49	0.49	0.49	0.3	<0.16	<0.019	0	69.1	30.9	V.Deg.PHC 77.4%,(FCM)
s	P142-B5 (2-4)	23.9	<0.6	<0.6	<0.6	<0.6	<0.12	<0.19	<0.024	0	0	0	PHC not detected
s	P142-B6 (6-8)	21.8	<0.55	<0.55	<0.55	<0.55	<0.11	<0.17	<0.022	0	38.9	61.1	Residual HC,(BO)
s	P142-B7 (2-4)	22.8	<0.57	1.4	0.57	1.97	0.28	<0.18	<0.023	85.4	11.8	2.8	Road Tar 76.9%,(FCM)
s	P142-B9 (0-2)	10.0	<0.25	<0.25	0.25	0.25	0.13	<0.08	<0.01	60.5	26.2	13.3	V.Deg.PHC 75.7%,(FCM)
s	P142-B8 (2-4)	20.6	<0.52	<0.52	5.4	5.4	2.4	<0.17	<0.021	0	74.6	25.4	V.Deg.PHC 96.7%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK

95.5 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

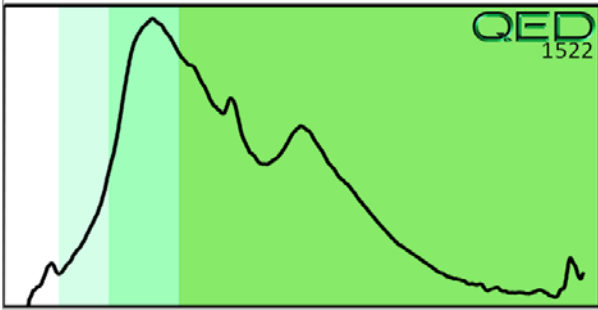
Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modified Result.

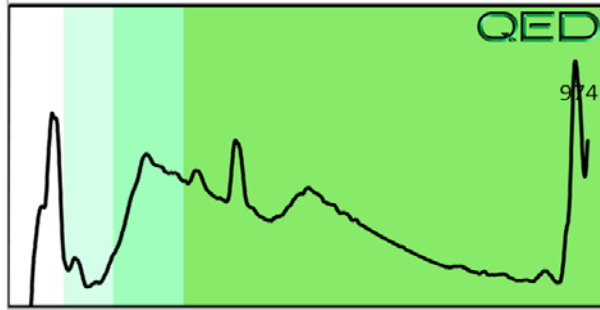
% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only.

Data generated by HC-1 Analyser

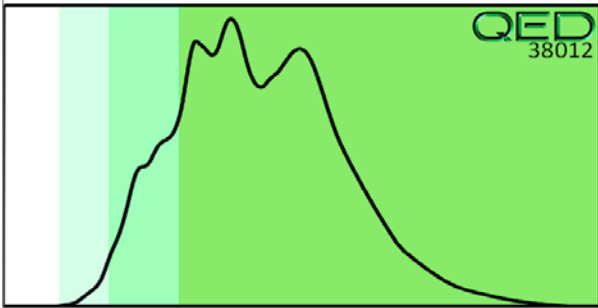
P142-B1 (2-4) : Deg.PHC 82%,(FCM),(BO)



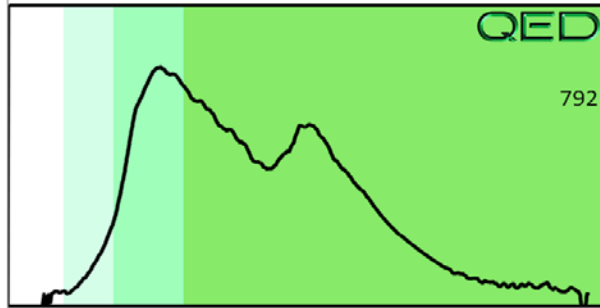
P142-B2 (2-4) : V.Deg.PHC 63.2%,(FCM),(BO),(P)



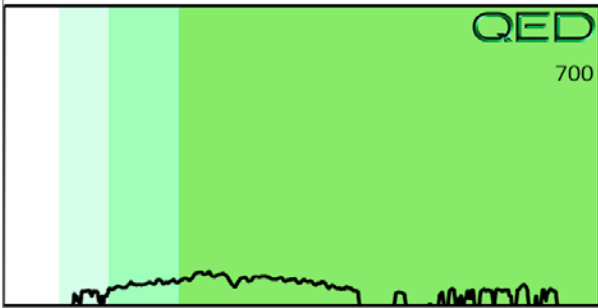
P142-B3 (2-4) : Deg.PHC 48.1%,(FCM),(BO)



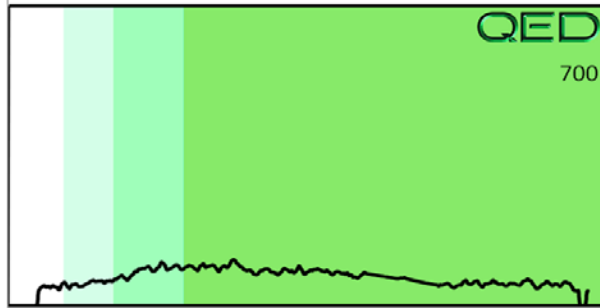
P142-B4 (4-0) : V.Deg.PHC 77.4%,(FCM)



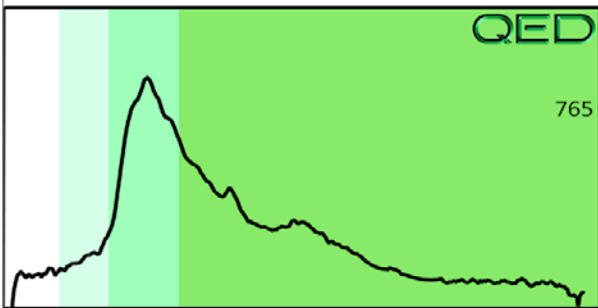
P142-B5 (2-4) : PHC not detected



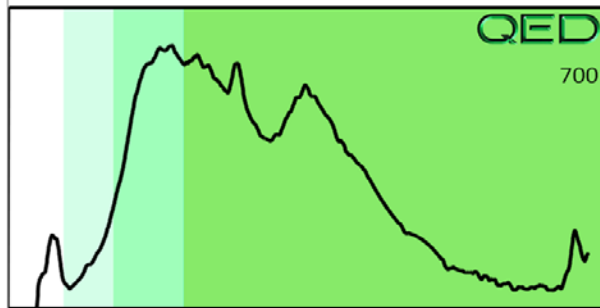
P142-B6 (6-8) : Residual HC,(BO)



P142-B7 (2-4) : Road Tar 76.9%,(FCM)



P142-B9 (0-2) : V.Deg.PHC 75.7%,(FCM)



P142-B8 (2-4) : V.Deg.PHC 96.7%,(FCM)

